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10/559,615	12/02/2005	Youichi Nanba	Q76011	1679

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EXAMINER
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1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/559,615	NANBA ET AL.	
	Examiner	Art Unit	
	Tony Chuo	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/2/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 12/2/05 was filed on 12/2/05. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner. Examiner's note: JP 53-94581 has not been considered because no English translation was submitted with the IDS.

Drawings

3. The drawings filed on 12/2/05 are accepted by the examiner.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir.

1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1, 2, 6, 7, and 11-30 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21, 23-29, and 31-34 of copending Application No. 10/577,849. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1, 2, 6, 7, and 11-30 of the present application are fully anticipated by claims 1-21, 23-29, and 31-34 of copending Application No. 10/577,849.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102/103

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-7, 9, 10, 13, 23, and 26-30 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamada (JP 10-116605).

Regarding claims 1, 2, 5, and 26-30, the Yamada reference discloses a lithium secondary battery comprising a negative electrode made of a molded product of an electrode paste comprising a carbon material and a polyvinylidene fluoride (binder), wherein the carbon material comprises a thermosetting resin (polymer) that is coated (deposited) onto carbon fiber particles that are further carbonized and graphitized at a temperature of 2000-3000°C (See paragraphs [0014],[0016],[0025]).

Examiner's note: It is noted that claims 1 and 2 are being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claim is the same as or obvious over the product of the prior art. Therefore, the claim is anticipated by Yamada. However, if the claim is not anticipated, the claim is obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims). In addition, it is well known in the art that lithium secondary battery comprises a non-aqueous electrolyte solution that contains ethylene carbonate, diethyl carbonate, and dimethyl carbonate.

Regarding claims 3 and 4, it also discloses a thermosetting resin such as phenol resin, furan resin, and polyimide resin (See paragraph [0018]).

Regarding claim 6, it also discloses a negative electrode material comprising a 2-phase structure of graphitized carbon fiber which implies that a graphite crystal structure region and an amorphous structure region are distributed throughout the entirety of a particle constituting the carbon material from the surface of the particle to a center portion thereof (See paragraph [0014]).

Regarding claim 7, an area ratio of a graphite crystal structure region having diffraction pattern formed of two or more spots to an amorphous structure region having a diffraction pattern formed of only one spot attributed to (002) plane is 99 to 20 : 1 to 70 is an inherent property of a carbon fiber particle that has been carbonized and graphitized at 2000°-3000°C.

Regarding claims 9 and 10, it also discloses a weight ratio of resin (organic compound) to carbon fiber of 50 parts to 200 parts resin to 100 parts carbon fiber (See paragraph [0018]).

Regarding claim 13, it also discloses particles formed of pitch based carbon fiber (See paragraph [0017]).

Regarding claim 23, it also discloses T-300 carbon fibers that inherently have a specific surface area of 0.45 m^2/g as evidenced by the Material Property Data Sheet for T-300 carbon fiber (See Table 1).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605). The Yamada reference is applied to claim 1 for reasons stated above.

However, Yamada does not expressly teach a carbon material that is produced by performing multiple times a process of causing the organic compound to deposit onto and/or permeate into the carbonaceous particles and subsequently polymerizing the organic compound, followed by thermal treatment at a temperature of 1,800 to 3,300°C. Examiner's note: It is noted that claim 8 is being construed as product-by-process and that the product itself does not depend on the process of making it. The product is construed as a carbon particle that multiple layers of polymer coated onto the particle.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada negative electrode material to include a carbon material that is produced by performing multiple times a process of causing the organic compound to deposit onto and/or permeate into the carbonaceous particles and subsequently polymerizing the organic compound, followed by thermal treatment at a temperature of 1,800 to 3,300°C because duplicating part for multiple effect was held to have been obvious (*In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960)).

11. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605) in view of Yamazaki et al (US 2002/0160266). The Yamada reference is applied to claim 1 for reasons stated above.

However, Yamada does not expressly teach a carbon material that contains boron in an amount of 10 to 5,000 ppm, wherein boron or boron compound is added after polymerization of the organic compound, followed by thermal treatment at 1,800 to 3,300°C. The Yamazaki reference discloses a negative electrode material of a lithium ion secondary battery comprising carbon fiber that is mixed with a boron compound and then graphitized which implies that the boron compound is added before thermal treatment, wherein the boron compound is added in an amount of 0.5 to 5% by weight which corresponds to an amount of 10 to 5,000 ppm (See paragraph [0058],[0059]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada negative electrode material to include a carbon material that contains boron in an amount of 10 to 5,000 ppm, wherein boron or boron compound is added after polymerization of the organic compound, followed by thermal treatment at 1,800 to 3,300°C in order to accelerate the graphitization of the carbon fiber, thereby producing a graphite material for a negative electrode of a lithium ion secondary battery that is large in charge/discharge capacity, high in charge/discharge efficiency, and low in deterioration of battery cycle characteristics (See paragraph [0025]). In addition, there is no evidence of the criticality of the claimed range of the amount of boron compound.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605). The Yamada reference is applied to claim 1 for reasons stated above. In addition, Yamada also disclose carbon fiber that has a mean fiber length of 100 μm (See paragraph [0025]).

However, Yamada does not expressly teach carbonaceous particles that have an average particle size of 10 to 40 μm and an average roundness of 0.85 to 0.99.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada negative electrode material to include carbonaceous particles that have an average particle size of 10 to 40 μm and an average roundness of 0.85 to 0.99 because changes in size were held to be obvious (*In re Rose* 105 USPQ 237 (CCPA 1955). In addition, there is no evidence of the criticality of the claimed range of the average particle size of the carbonaceous particles.

13. Claims 15, 18, 19, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605) in view of Nakai et al (US 6447946). The Yamada reference is applied to claim 1 for reasons stated above. In addition, Yamada also discloses carbon fiber that has an average interlayer distance (d_{002}) of less than 0.340 nm (See paragraph [0019]).

However, Yamada does not expressly teach carbon fiber having a filament diameter of 2 to 1,000 nm, wherein the carbon fiber is vapor grown fiber that each has an aspect ratio of 10 to 15,000. The Nakai reference discloses a negative electrode of a lithium ion secondary battery comprising vapor grown carbon fiber that has a filament

diameter of 200 nm and a fiber length of 15,000 nm, which corresponds to an aspect ratio of 75 (See column 4, lines 1-9 and Example 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada negative electrode material to include carbon fiber having a filament diameter of 2 to 1,000 nm, wherein the carbon fiber is vapor grown fiber that each has an aspect ratio of 10 to 15,000 in order to utilize carbon fibers that improve the cycle characteristics of the battery while having high capacity and high power.

14. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605) in view of Nakai et al (US 6447946) as applied to claim 15 above, and further in view of Mrotek et al (US 5776633).

However, Yamada as modified by Nakai et al does not expressly teach at least a portion of the carbon fiber that is deposited onto the surface of the carbon powder, wherein the amount of carbon fiber is 0.01 to 20 parts by mass on the basis of 100 parts mass of the carbonaceous particles. The Mrotek reference discloses carbon/carbon composite useful as components of electrode structures of batteries comprising a mixture of carbon powder and carbon fiber, wherein the ratio of carbon fiber to carbon powder is 20% carbon fiber to 80% carbon powder (See column 4, lines 22-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada/Nakai negative electrode material to include carbon powder, wherein at least a portion of the carbon fiber is deposited onto the surface of the carbon powder, wherein the amount of carbon fiber is 0.01 to 20 parts

by mass on the basis of 100 parts mass of the carbonaceous particles in order to utilize materials that provide improvements in mechanical properties, resistivity, and surface area.

15. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605) in view of Nakai et al (US 6447946) as applied to claim 18 above, and further in view of Gernov et al (US 6194099).

However, Yamada as modified by Nakai does not expressly teach each fiber filament of the vapor grown carbon fiber that includes a hollow space extending along its center axis. The Gernov reference discloses carbon nanofibers in the form of hollow tubes that are suitable for use in a battery electrode (See column 8, lines 24-25).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Gernov indicates that carbon nanofibers in the form of hollow tubes is a suitable material for use as a battery electrode. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use carbon nanofibers in the form of hollow tubes.

16. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (JP 10-116605) in view of Nakai et al (US 6447946) as applied to claim 18 above, and further in view of Nishimura et al (US 6528211).

However, Yamada as modified by Nakai does not expressly teach vapor grown carbon fiber that contains branched carbon fiber filaments. The Nishimura reference

discloses a battery electrode material comprising carbon nanofibers having branching fibers made by vapor phase growth methods (See column 4, lines 27-30).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Nishimura indicates that carbon nanofiber having branching fibers made by vapor phase growth methods is a suitable material for use as a battery electrode. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use carbon nanofiber having branching fibers made by vapor phase growth methods.

17. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al (US 5919589) in view of Yamada (JP 10-116605).

The Kawakami reference discloses a method of making a carbon material for forming a battery anode containing a graphite powder (carbon powder having a homogeneous structure) comprising a step of dispersing graphite powder in a monomer solution (raw material of a polymer) to thereby cause the monomer to deposit onto the graphite powder; a step of polymerizing the monomer; and a step of baking (thermally treating) the resultant product at a temperature of from 600°C to 1500°C (See column 4, lines 52-61).

However, Kawakami et al does not expressly teach a step of thermally treating the resultant product at a temperature of 1,800 to 3,300°C. The Yamada reference discloses a step of carbonizing (thermally treating) a polymer coated carbon powder at a temperature of 2,000 to 3,000°C (See Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami method of making a carbon material for forming a battery anode to include a step of thermally treating the resultant product at a temperature of 1,800 to 3,300°C in order to thermally treat the carbon material at a sufficient temperature to carbonize and graphitize the carbon material, thereby producing a negative electrode material with a large charge and discharge capacity.

18. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al (US 5919589) in view of Mrotek et al (US 5776633), Yamada (JP 10-116605), and further in view of Nakai et al (US 6447946).

The Kawakami reference discloses a method of making a carbon material for forming a battery anode containing a graphite powder (carbonaceous particles) comprising a step of dispersing graphite powder in a monomer solution (raw material of a polymer) to thereby cause the monomer to deposit onto the graphite powder; a step of polymerizing the monomer; and a step of baking (thermally treating) the resultant product at a temperature of from 600°C to 1500°C (See column 4, lines 52-61).

However, Kawakami et al does not expressly teach a step of treating carbonaceous particles with a mixture of an organic compound serving as a raw material of a polymer and carbon fibers, wherein at least a portion of the carbon fiber is deposited onto the surface of the carbon powder. The Mrotek reference teaches the concept of treating carbon powder with a solution of phenolic resin and carbon fibers,

wherein at least a portion of the carbon fiber is deposited onto the surface of the carbon powder (See column 3, line 25 to column 4, line 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami method of making a carbon material for forming a battery anode to include a step of treating carbonaceous particles with a mixture of an organic compound serving as a raw material of a polymer and carbon fibers in order to improve the mechanical properties, resistivity, and surface area of the battery electrode.

However, Kawakami et al as modified by Mrotek et al does not expressly teach a step of thermally treating the resultant product at a temperature of 1,800 to 3,300°C. The Yamada reference discloses a step of carbonizing (thermally treating) a polymer coated carbon powder at a temperature of 2,000 to 3,000°C (See Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami/Mrotek method of making a carbon material for forming a battery anode to include a step of thermally treating the resultant product at a temperature of 1,800 to 3,300°C in order to thermally treat the carbon material at a sufficient temperature to carbonize and graphitize the carbon material to produce a negative electrode material with a large charge and discharge capacity.

However, Kawakami et al as modified by Mrotek et al and Yamada does not expressly teach a carbon fiber having a filament diameter of 2 to 1,000 nm. The Nakai reference discloses a negative electrode of a lithium ion secondary battery comprising

vapor grown carbon fiber that has a filament diameter of 200 nm and a fiber length of 15,000 nm (See column 4, lines 1-9 and Example 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami/Mrotek/Yamada method of making a carbon material for forming a battery anode to include carbon fiber having a filament diameter of 2 to 1,000 nm in order to utilize carbon fibers that improve the cycle characteristics of the battery while having high capacity and high power.

19. Claims 1, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamata et al (JP 2000-319067).

The Kawamata reference discloses a fuel cell comprising a fuel cell separator that comprises carbonaceous compound particles, graphite particles, and polyethylene glycol (polymer) that adheres the carbon particles together, wherein the resulting polymer coated carbon particles are heat treated at 1800°C (See paragraph [0024]).

However, Kawamata et al does not expressly teach a fuel cell separator comprising an amount of 5 to 95 mass% the carbon material recited in claim 1.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawamata separator to include an amount of 5 to 95 mass% the carbon material recited in claim 1 because result effective variables were held to have been obvious (*In re Boesch*, 617 F.2d 272,205 USPQ 215 (CCPA 1980)). The amount of carbon material is a result effective variable of optimizing the moldability of the separator such as adding a mold release agent. In addition, there is no evidence of the criticality of the claimed range of the amount of carbon material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795